CLAIMS

1. A gait producing device for a moving robot that sets a desired value of a floor reaction force moment horizontal component generated by a motion of a moving robot and a permissible range of a translational floor reaction force horizontal component and produces a desired gait that includes at least a desired motion of the moving robot such that the desired value of the floor reaction force moment horizontal component and the permissible range of the translational floor reaction force horizontal component are satisfied, comprising:

a provisional motion creating means that uses a predetermined first dynamic model of the moving robot to create a provisional motion, which indicates a provisional value of the desired motion, such that the desired value of the floor reaction force moment horizontal component and the permissible range of the translational floor reaction force horizontal component are satisfied on the first dynamic model, and a provisional motion correcting means that corrects the created provisional motion by using the first dynamic model and a predetermined second dynamic model having a dynamic accuracy that is higher than that of the first dynamic model and obtains the corrected motion as the desired motion,

wherein provided that, relative to arbitrary time t of the provisional motion, a difference between the floor reaction force moment horizontal component M2(t) generated

at the time t on the second dynamic model by the provisional motion and the floor reaction force moment horizontal component M1(t) generated at the time t on the first dynamic model by the provisional motion (M2(t)-M1(t)) is defined as a floor reaction force moment horizontal component error Merr(t), and a difference between the translational floor reaction force horizontal component F2(t) generated at the time t on the second dynamic model by the provisional motion and the translational force horizontal component F1(t) generated at the time t on the first dynamic model by the provisional motion (F2(t)-F1(t)) is defined as a translational floor reaction force horizontal component error Ferr(t), then

the provisional motion correcting means corrects an instantaneous value of the provisional motion at the time t such that a value obtained by adding either the floor reaction force moment horizontal component error Merr(t) or a first floor reaction force correction amount determined on the basis of at least the floor reaction force moment horizontal component error Merr(t) to the floor reaction force moment horizontal component generated at the time t on the first dynamic model by a motion obtained by correcting the provisional motion agrees with the desired value at the time t, and a value obtained by adding either the translational floor reaction force horizontal component error Ferr(t) or a second floor reaction force correction amount determined on the basis of

at least the translational floor reaction force horizontal component error Ferr(t) to a translational floor reaction force horizontal component generated at the time t on the first dynamic model by a motion obtained by correcting the provisional motion satisfies the permissible range at the time t.

2. A gait producing device for a moving robot that sets a desired value of a floor reaction force moment horizontal component generated by a motion of a moving robot and a permissible range of a translational floor reaction force horizontal component and produces a desired gait that includes at least a desired motion of the moving robot such that the desired value of the floor reaction force moment horizontal component and the permissible range of the translational floor reaction force horizontal component are satisfied, comprising:

a provisional motion creating means that uses a predetermined first dynamic model of the moving robot to create a provisional motion, which indicates a provisional value of the desired motion, such that the desired value of the floor reaction force moment horizontal component and the permissible range of the translational floor reaction force horizontal component are satisfied on the first dynamic model, and a provisional motion correcting means that corrects the created provisional motion by using the first dynamic model and a predetermined second dynamic

model having a dynamic accuracy that is higher than that of the first dynamic model and obtains the corrected motion as the desired motion,

wherein provided that, relative to arbitrary time t of the provisional motion, a difference between the floor reaction force moment horizontal component M2(t) generated at the time t on the second dynamic model by the provisional motion and the desired value MT(t) of the floor reaction force moment horizontal component at the time t (M2(t)-MT(t)) is defined as a floor reaction force moment horizontal component error Merr(t), and a difference between the translational floor reaction force horizontal component F2(t) generated at the time t on the second dynamic model by the provisional motion and the translational force horizontal component F1(t) generated at the time t on the first dynamic model by the provisional motion (F2(t)-F1(t)) is defined as a translational floor reaction force horizontal component error Ferr(t), then

the provisional motion correcting means corrects an instantaneous value of the provisional motion at the time t such that a value obtained by adding either the floor reaction force moment horizontal component error Merr(t) or a first floor reaction force correction amount determined on the basis of at least the floor reaction force moment horizontal component error Merr(t) to the floor reaction force moment horizontal component generated at the time t on the first dynamic model by a motion

obtained by correcting the provisional motion agrees with the desired value at the time t, and a value obtained by adding either the translational floor reaction force horizontal component error Ferr(t) or a second floor reaction force correction amount determined on the basis of at least the translational floor reaction force horizontal component error Ferr(t) to the translational floor reaction force horizontal component generated at the time t on the first dynamic model by a motion obtained by correcting the provisional motion satisfies the permissible range at the time t.

3. A gait producing device for a moving robot that sets a desired ZMP of a moving robot and a permissible range of a translational floor reaction force horizontal component generated by a motion of the moving robot, and generates a desired gait that includes at least a desired motion of the moving robot such that the desired ZMP and the permissible range of the translational floor reaction force horizontal component are satisfied, comprising:

a provisional motion creating means that uses a predetermined first dynamic model of the moving robot to create a provisional motion, which indicates a provisional value of the desired motion, such that the desired ZMP and the permissible range of the translational floor reaction force horizontal component are satisfied on the first dynamic model, and a provisional motion correcting means

that corrects the created provisional motion by using the first dynamic model and a predetermined second dynamic model having a dynamic accuracy that is higher than that of the first dynamic model and obtains the corrected motion as the desired motion,

wherein provided that, relative to arbitrary time t of the provisional motion, a difference between ZMP2(t), which is a ZMP calculated at the time t on the second dynamic model from the provisional motion, and ZMP1(t), which is a ZMP calculated at time t on the first dynamic model from the provisional motion, (ZMP2(t)-ZMP1(t)) is defined as a ZMP error ZMPerr(t), and a difference between the translational floor reaction force horizontal component F2(t) generated at the time t on the second dynamic model by the provisional motion and the translational force horizontal component F1(t) generated at the time t on the first dynamic model by the provisional motion (F2(t)-F1(t)) is defined as a translational floor reaction force horizontal component error Ferr(t), then

the provisional motion correcting means corrects an instantaneous value of the provisional motion at the time t such that a value obtained by adding either the ZMP error ZMPerr(t) or a ZMP correction amount determined on the basis of at least the ZMP error ZMPerr(t) to a ZMP calculated at the time t on the first dynamic model from a motion obtained by correcting the provisional motion agrees with the desired ZMP at the time t, and a value obtained by

adding either the translational floor reaction force horizontal component error Ferr(t) or a floor reaction force correction amount determined on the basis of at least the translational floor reaction force horizontal component error Ferr(t) to the translational floor reaction force horizontal component generated at the time t on the first dynamic model by a motion obtained by correcting the provisional motion satisfies the permissible range at the time t.

4. A gait producing device for a moving robot that sets a desired ZMP of a moving robot and a permissible range of a translational floor reaction force horizontal component generated by a motion of the moving robot, and generates a desired gait that includes at least a desired motion of the moving robot such that the desired ZMP and the permissible range of the translational floor reaction force horizontal component are satisfied, comprising:

a provisional motion creating means that uses a predetermined first dynamic model of the moving robot to create a provisional motion, which indicates a provisional value of the desired motion, such that the desired ZMP and the permissible range of the translational floor reaction force horizontal component are satisfied on the first dynamic model, and a provisional motion correcting means that corrects the created provisional motion by using the first dynamic model and a predetermined second dynamic

model having a dynamic accuracy that is higher than that of the first dynamic model and obtains the corrected motion as the desired motion,

wherein provided that, relative to arbitrary time t of the provisional motion, a difference between ZMP2(t), which is a ZMP calculated at the time t on the second dynamic model from the provisional motion, and a desired ZMP(t), which is the desired ZMP at the time t, (ZMP2(t)-desired ZMP(t)) is defined as a ZMP error ZMPerr(t), and a difference between the translational floor reaction force horizontal component F2(t) generated at the time t on the second dynamic model by the provisional motion and the translational floor reaction force horizontal component F1(t) generated at the time t on the first dynamic model by the provisional motion (F2(t)-F1(t)) is defined as a translational floor reaction force horizontal component error Ferr(t), then

the provisional motion correcting means corrects an instantaneous value of the provisional motion at the time t such that a value obtained by adding either the ZMP error ZMPerr(t) or a ZMP correction amount determined on the basis of at least the ZMP error ZMPerr(t) to a ZMP calculated at the time t on the first dynamic model from a motion obtained by correcting the provisional motion agrees with the desired ZMP(t) at the time t, and a value obtained by adding either the translational floor reaction force horizontal component error Ferr(t) or a floor reaction

force correction amount determined on the basis of at least the translational floor reaction force horizontal component error Ferr(t) to the translational floor reaction force horizontal component generated at the time t on the first dynamic model by a motion obtained by correcting the provisional motion satisfies the permissible range at the time t.